

What is claimed is:

5 SUB 1. A topical formulation for reducing skin irritation in animals comprising about 0.5 to about 10% by weight of the total formulation of an aqueous-soluble divalent strontium cation, and a suitable topical formulation vehicle.

2. The formulation of claim 1 wherein the formulation is an aqueous liquid.

10 3. The formulation of claim 1 wherein the formulation is a cream, lotion or gel.

4. The formulation of claim 1 wherein the formulation is a solid.

15 5. The formulation of claim 2 wherein the formulation vehicle comprises water and an organic solvent.

6. The formulation of claim 5 wherein the organic solvent is an alcohol.

7. The formulation of claim 2 wherein the formulation vehicle comprises a surfactant.

20 8. The formulation of claim 7 wherein the surfactant comprises a nonionic surfactant.

9. The formulation of claim 7 wherein the surfactant comprises a cationic surfactant.

10. The formulation of claim 7 wherein the surfactant comprises an amphoteric surfactant.

11. The formulation of claim 7 wherein the surfactant comprises at least one anionic surfactant and at least one amphoteric surfactant.

12. The formulation of claim 11 wherein the anionic surfactant comprises at least one surfactant selected from the group consisting of ammonium laureth sulfate, TEA laureth sulfate, sodium lauryl sulfosuccinate, sodium lauryl sarcosinate, and sodium laureth sulfate.

13. The formulation of claim 11 wherein the amphoteric surfactant comprises oleyl betaine or cocamidopropyl betaine.

14. The formulation of claim 7 wherein the surfactant comprises at least one nonionic and at least one cationic surfactant.

15. The formulation of claim 14 wherein the nonionic surfactant comprises at least one surfactant selected from the group consisting of Polysorbate 20, Polysorbate 40, Polysorbate 60, and Polysorbate 80.

16. The formulation of claim 14 wherein the cationic surfactant comprises cocamidopropyl phosphatidyl PG-dimonium chloride.

17. The formulation of claim 2 wherein the formulation vehicle further comprises at least one ingredient selected from the group consisting of viscosity adjusting agents, emollients, and moisturizers.

5 18. The formulation of claim 2 wherein the formulation vehicle comprises water and at least one ingredient selected from the group consisting of preservatives, fragrances, dyes, pigments, and colorants.

10 19. The formulation of claim 2 wherein the formulation comprises an active ingredient.

20 20. The formulation of claim 19 wherein the active ingredient is selected from the group consisting of antibiotic, local anesthetic, sunscreen, retinoid, antiperspirant, antihistamine, analgesic, contraceptive, anti-acne and anti-dandruff ingredients.

15 21. The formulation of claim 2 wherein the formulation further comprises an irritant ingredient.

20 22. The formulation of claim 21 wherein the irritant ingredient is selected from the group consisting of carboxylic acids, keto acids, α -hydroxy acids, β -hydroxy acids, retinoids, peroxides, fragrances, preservatives, and organic alcohols.

23. The formulation of claim 21 wherein the irritant ingredient comprises an α -hydroxy acid.
24. The formulation of claim 23 wherein the α -hydroxy acid comprises at least one acid
5 selected from the group consisting of lactic acid, glycolic acid, citric acid, and salts thereof.
25. The formulation of claim 21 wherein the irritant ingredient is a retinoid selected from tretinoin, retinol, retinal and derivatives thereof.
26. The formulation of claim 3 wherein the formulation vehicle comprises a surfactant.
27. The formulation of claim 26 wherein the surfactant comprises a nonionic surfactant.
28. The formulation of claim 26 wherein the surfactant comprises a cationic surfactant.
29. The formulation of claim 26 wherein the surfactant comprises an amphoteric surfactant.
30. The formulation of claim 26 wherein the surfactant comprises at least one anionic surfactant and at least one amphoteric surfactant.

31. The formulation of claim 30 wherein the anionic surfactant comprises at least one surfactant selected from the group consisting of ammonium laureth sulfate, TEA laureth sulfate, sodium lauryl sulfosuccinate, sodium lauryl sarcosinate, and sodium laureth sulfate.

32. The formulation of claim 30 wherein the amphoteric surfactant comprises oleyl betaine or cocamidopropyl betaine.

33. The formulation of claim 3 wherein the formulation vehicle comprises at least one ingredient selected from the group consisting of viscosity adjusting agents, emollients, and moisturizers.

34. The formulation of claim 3 wherein the formulation vehicle comprises at least one ingredient selected from the group consisting of preservatives, fragrances, dyes, pigments, and colorants.

35. The formulation of claim 3 wherein the formulation comprises an active ingredient.

36. The formulation of claim 35 wherein the active ingredient is selected from the group consisting of antibiotic, local anesthetic, sunscreen, retinoid, antiperspirant, antihistamine, analgesic, contraceptive, anti-acne and anti-dandruff ingredients.

37. The formulation of claim 3 wherein the formulation further comprises an irritant ingredient.

38. The formulation of claim 37 wherein the irritant ingredient is selected from the group consisting of carboxylic acids, keto acids, α -hydroxy acids, β -hydroxy acids, retinoids, peroxides, and organic alcohols.

39. The formulation of claim 38 wherein the irritant ingredient comprises an α -hydroxy acid.

40. The formulation of claim 39 wherein the α -hydroxy acid comprises at least one acid selected from the group consisting of lactic acid, glycolic acid, citric acid, and salts thereof.

41. The formulation of claim 37 wherein the irritant ingredient is a retinoid selected from tretinoin, retinol, retinal and derivatives thereof.

42. The formulation of claim 3 wherein the formulation vehicle comprises an emulsifier.

43. The formulation of claim 42 wherein the emulsifier comprises a nonionic emulsifier.

44. The formulation of claim 42 wherein the emulsifier comprises a cationic emulsifier.

45. The formulation of claim 42 wherein the emulsifier comprises at least one nonionic emulsifier and at least one cationic emulsifier.

46. The formulation of claim 4 wherein the formulation vehicle comprises a surfactant.

47. The formulation of claim 46 wherein the surfactant comprises a nonionic surfactant.

48. The formulation of claim 46 wherein the surfactant comprises a cationic surfactant.

49. The formulation of claim 46 wherein the surfactant comprises an amphoteric surfactant.

50. The formulation of claim 46 wherein the surfactant comprises at least one anionic surfactant and at least one amphoteric surfactant.

51. The formulation of claim 50 wherein the anionic surfactant comprises at least one surfactant selected from the group consisting of ammonium laureth sulfate, TEA laureth sulfate, sodium lauryl sulfosuccinate, sodium lauryl sarcosinate, and sodium laureth sulfate.

52. The formulation of claim 50 wherein the amphoteric surfactant comprises oleyl betaine or cocamidopropyl betaine.

53. The formulation of claim 4 wherein the formulation vehicle comprises at least one ingredient selected from the group consisting of viscosity adjusting agents, emollients and moisturizers.

5 54. The formulation of claim 4 wherein the formulation vehicle comprises at least one ingredient selected from the group consisting of preservatives, fragrances, dyes, pigments, and colorants.

10 55. The formulation of claim 4 wherein the formulation comprises an active ingredient.

56. The formulation of claim 55 wherein the active ingredient is selected from the group consisting of antibiotic, local anesthetic, sunscreen, retinoid, antiperspirant, antihistamine, analgesic, contraceptive, anti-acne and anti-dandruff ingredients.

15 57. The formulation of claim 4 wherein the formulation further comprises an irritant ingredient.

20 58. The formulation of claim 57 wherein the irritant ingredient is selected from the group consisting of carboxylic acids, keto acids, α -hydroxy acids, β -hydroxy acids, retinoids, peroxides, and organic alcohols.

59. The formulation of claim 58 wherein the irritant ingredient comprises an α -hydroxy acid.

60. The formulation of claim 59 wherein the α -hydroxy acid comprises at least one acid selected from the group consisting of lactic acid, glycolic acid, citric acid, and salts thereof.

61. The formulation of claim 57 wherein the irritant ingredient is a retinoid selected from tretinoin, retinol, retinal and derivatives thereof.

62. The formulation of claim 4 wherein the formulation vehicle comprises an emulsifier.

63. The formulation of claim 62 wherein the emulsifier comprises a nonionic emulsifier.

64. The formulation of claim 62 wherein the emulsifier comprises a cationic emulsifier.

65. The formulation of claim 62 wherein the emulsifier comprises at least one nonionic emulsifier and at least one cationic emulsifier.